

REMARKS

I. STATUS OF THE CLAIMS

Claims 1-4 and 8-30 are currently pending.

II. REJECTION OF CLAIMS 3-4, 10-11, 13-14, 17-18, 21-22, 25-26 AND 28-29 UNDER 35 USC 112, FIRST PARAGRAPH

Claim 3 recites a multi-stage optical amplifier to amplify the WDM optical signal ... with substantially equal gain, over the wavelengths of the optical signals *and time*". The Examiner asserts that the recitation "and time" is not supported by the specification.

Please refer to the following portions in the original specification:

1. Page 2, lines 16-20:

"A more specific object of the present invention is to provide a multi-wavelength light amplifier which does not have wavelength-dependence of the gain, which is not changed due to a variation in the power of the input light."

2. Page 11, lines 23-28:

"Hence, the total gain obtained by the amplifiers 1 and 2 can be maintained at a constant (flat) level. By combining the two amplifiers together as described above, it is possible for the multi-wavelength light amplifier to have no waveform-dependence of the gain thereof."

2. Page 11, lines 29-34:

"The above waveform-dependence of the gain can be maintained at a constant level irrespective of a variation in the input power by . . . the feedback loop including the light splitting coupler 12, the photodiode 13, the ALC circuit 14 and the variable attenuator 11."

It should be understood that the variation in the power of the input light is a phenomenon that occurs not in the wavelength domain but in the time domain, and that maintaining the waveform-dependence of the gain to be constant (flat) irrespective of a variation in the input power is also a function with respect to the time domain. In other words, the description on page 11, lines 29-34, that "the above waveform-dependence of the gain can be maintained at a

constant level irrespective of a variation in the input power", inherently discloses the recited feature "and time".

In view of the above it is respectfully submitted that the rejection is overcome.

III. REJECTION OF CLAIMS 1-4 AND 8-30 UNDER 35 USC 103 AS BEING OBVIOUS OVER DIGIOVANNI (US PATENT NO. 5,050,949) IN VIEW OF NAITO (US PATENT NO. 5,568,310)

In the present invention as recited, for example, in claim 1, an optical transmission system comprises (a) an optical transmitter transmitting a WDM optical signal including a plurality of optical signals with different wavelengths; (b) a multi-stage optical amplifier amplifying the WDM optical signal received from the optical transmitter with substantially equal gain with respect to the wavelengths of the plurality of the optical signals independently of variation of the received WDM optical signal level and outputting the amplified WDM optical signal; and (c) an optical receiver receiving the amplified WDM optical signal output from the multi-stage optical amplifier.

Moreover, as recited, for example, in claim 1, the multi-stage optical amplifier includes (i) a first-stage optical amplifier which amplifies the received WDM optical signal, (ii) a level controller which controls a power level of the WDM optical signal amplified by the first-stage optical amplifier, and (iii) a second-stage optical amplifier which amplifies the WDM optical signal of which level is controlled by the level controller.

Therefore, as recited, for example, in claim 1, the multi-stage optical amplifier amplifies the WDM optical signal received from the optical transmitter with substantially equal gain with respect to the wavelengths of the plurality of the optical signals *independently of variation of the received WDM optical signal level*.

DiGiovanni discloses an optical amplifier having a first stage 12 and a second stage 14. See, for example, FIG. 1 of DiGiovanni.

However, DiGiovanni does not disclose or suggest a level controller which controls a power level of the WDM optical signal amplified by the first-stage optical amplifier, as recited, for example, in claim 1.

In the Office Action, the Examiner correlates element 36 of DiGiovanni to the claimed level controller. However, element 36 of DiGiovanni operates as a filter to pass amplified channels and suppress amplified spontaneous emission. See, for example, column 3, lines 41-48, of DiGiovanni. DiGiovanni does not operate as a level controller as recited, for example, in claim 1.

The Examiner asserts that the equation in column 4, line 50, of DiGiovanni, discloses a gain adjustment which is independent of a received WDM signal level.

It is respectfully submitted that the equation in DiGiovanni simply indicates the change in net gain at wavelength λ_{S2} , $\partial G(\lambda_{S1}; \lambda_{S2})$ after the gain at λ_{S1} has been changed by +1 dB in the first stage and -1 dB in the second stage. See, for example, column 4, lines 52-60, of DiGiovanni.

The equation disclosed in DiGiovanni does not disclose or suggest that a multi-stage optical amplifier amplifies a WDM optical signal with substantially equal gain with respect to the wavelengths of the plurality of the optical signals *independently of variation of the received WDM optical signal level*, as recited, for example, in claim 1.

The above comments are specifically directed to claim 1. However, it is respectfully submitted that the comments would be helpful in understanding various differences of various other claims over DiGiovanni.

* * *

In the present invention as recited, for example, in claim 3, an optical transmission system comprises (a) an optical transmitter transmitting a WDM optical signal including a plurality of optical signals with different wavelengths; (b) a multi-stage optical amplifier to amplify the WDM optical signal from the optical transmitter with substantially equal gain, over the wavelengths of the optical signals and time, and to output the amplified WDM optical signal; and (c) an optical receiver receiving the amplified WDM optical signal from the multi-stage optical amplifier.

As recited, for example, in claim 3, the multi-stage optical amplifier includes (i) a first-stage optical amplifier which amplifies the WDM optical signal, (ii) a level controller which controls a power level of the WDM optical signal amplified by the first-stage optical amplifier, and (iii) a second-stage optical amplifier which amplifies the WDM optical signal of which level is controlled by the level controller.

In accordance with the above comments, it is respectfully submitted that DiGiovanni does not disclose or suggest any manner of obtaining substantially equal gain, over wavelengths *and time*, as recited, for example, in claim 3.

The above comments are specifically directed to claim 3. However, it is respectfully submitted that the comments would be helpful in understanding differences of various other claims over DiGiovanni.

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In view of the above, it is respectfully submitted that the rejection is overcome.

IV. CONCLUSION

In view of the above, it is respectfully submitted that the application is in condition for allowance, and a Notice of Allowance is earnestly solicited.

If any further fees are required in connection with the filing of this response, please charge such fees to our Deposit Account No. 19-3935.

Respectfully submitted,

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